Title: Passage of feed through the gastrointestinal tract of dairy cows
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Passage of feed through the gastrointestinal tract of dairy cows is an essential part of modern feed evaluation systems for ruminants (e.g. the Dutch DVE/OEB_{2010} system). Knowledge of feed and nutrient specific passage is however largely lacking. Common feed evaluation systems assume fixed fractional passage rates from the rumen; e.g. 4.5 and 6.0 %/h for proteins and starch in forages, and in concentrates, respectively (DVE/OEB_{2010}). Furthermore, fractional passage rates were commonly derived from passage studies based on external markers, which are criticised for behaving differently than the feed particles they are associated with. A series of *in vivo* experiments were therefore conducted to assess rumen fractional passage of carbohydrate fractions for maize silage and concentrates in dairy cattle. Stable isotopes of carbon (^{13}C) were used as internal markers and compared to chromium-mordanted fibres as a commonly used external marker to derive respective fractional passage rates. The latter gave overall higher rates (mean ±SEM; 4.2 ±0.51 %/h) than ^{13}C in cell walls (2.1 ±0.38 %/h) or similar rates than ^{13}C in starch (4.2 ±0.81 %/h) of maize silages, but gave considerably lower rates (3.8 ±0.50 %/h) than ^{13}C in cell walls (6.2 ±0.50 %/h) of concentrates. Our results suggest that fractional passage based on ^{13}C reflect better the passage of different feed types and carbohydrate fractions than when based on chromium-mordanted fibre. Future research should focus on the evaluation of passage kinetics for isolated carbohydrate fractions (e.g. cellulose, hemicellulose) and protein fractions (e.g. soluble proteins, peptides).